

Patent claims

1. Electrical coil with cooling system,  
whereby the cooling system comprises a heat dissipation device with a fluid (2)  
5 and a tempered reservoir (6) of this fluid,  
and whereby the coil (1)(3)(9) is coupled to the tempered reservoir (6) by means of  
the fluid (2); and the reservoir (6) is temperature-regulated such that the  
temperature as well as the pressure of the fluid (2) is kept in immediate proximity  
of the critical point of the fluid (2).  
10
2. Electrical coil according to claim 1,  
characterized in that  
the coupling is formed via a tube (7) that conducts heat well, which tube contains  
the fluid (2) and is situated in thermal contact (8) with the coil conductor (9) in that  
15 it passes through the electrical coil.
3. Electrical coil according to claim 1,  
characterized in that  
the coupling comprises the conductor (1) of the electrical coil itself, in that this (1)  
20 is fashioned tube-like and contains the fluid (2).
4. Electrical coil according to claim 1,  
characterized in that  
the coupling comprises a heat-insulating tube (4) inside (2) [sic] which the coil  
25 conductor (3) is coaxially directed and which simultaneously contains the fluid (2).
5. Electrical coil according to any of the claims 1 through 4,  
characterized in that  
the critical temperature of the fluid (2) corresponds to approximately room  
30 temperature.

6. Electrical coil according to any of the claims 1 through 5,  
characterized in that  
the fluid (2) is carbon dioxide or  $C_2F_6$ .
- 5 7. Electrical coil according to any of the claims 1 through 6,  
characterized in that  
temperature and pressure of the fluid (2) in the reservoir (6) are kept in immediate  
proximity of the critical point via a heat exchanger.
- 10 8. Gradient coil for a nuclear magnetic resonance tomography apparatus  
with an electrical coil with cooling system according to any of the claims 1 through  
7.
9. Gradient coil according to claim 8,  
15 characterized in that  
the coil is a transversal gradient coil.
10. Gradient coil according to claim 8,  
characterized in that  
20 the coil is an axial gradient coil.
11. Shim coil for an nuclear magnetic resonance tomography apparatus  
with an electrical coil with cooling system according to any of the claims 1 through  
7.
- 25 12. Nuclear magnetic resonance tomography apparatus with shim irons and  
cooling system,  
whereby the cooling system comprises a heat dissipation device with a fluid (2)  
and a tempered reservoir (6) of this fluid (2),  
30 and whereby the shim irons is [sic] coupled to the tempered reservoir (6) by means  
of the fluid (2) and the reservoir (6) is temperature-regulated such that the

temperature as well as the pressure of the fluid (2) is kept in immediate proximity of the critical point of the fluid (2).

13. Nuclear magnetic resonance tomography apparatus according to claim 12,  
5 characterized in that  
the shim channels (13) are thermally coupled to a tube system (15) containing the fluid (2).

14. Nuclear magnetic resonance tomography apparatus according to any of the  
10 claims 12 through 13,  
characterized in that  
the critical temperature of the fluid (2) approximately corresponds to room temperature.

15 15. Nuclear magnetic resonance tomography apparatus according to any of the claims 12 through 14,  
characterized in that  
the fluid is carbon dioxide or C<sub>2</sub>F<sub>6</sub>.

20 16. Nuclear magnetic resonance tomography apparatus according to any of the claims 12 through 15,  
characterized in that  
the temperature and pressure of the fluid (2) in the reservoir (6) is [sic] kept in the immediate proximity of the critical point via a heat exchanger.

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